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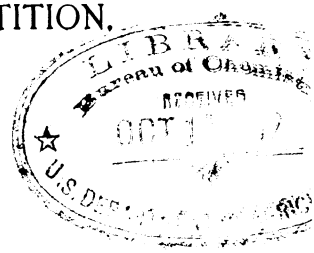
U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF ANIMAL INDUSTRY.—CIRCULAR 205.

A. D. MELVIN, CHIEF OF BUREAU.

MILK AND CREAM CONTESTS.

HOW TO CONDUCT THEM, AND HOW TO PREPARE SAMPLES FOR COMPETITION.



BY

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
Washington, D. C., July 26, 1912.

SIR: I have the honor to transmit herewith, and to recommend for publication as a circular of this bureau, a manuscript entitled "Milk and Cream Contests," by Mr. Ernest Kelly, of the Dairy Division. The paper gives a history of these contests in the United States, together with advice concerning the manner of conducting them, and hints to dairymen on the best methods of preparing samples.

The first competitive exhibition of milk and cream was held under the direction of the Dairy Division in connection with the National Dairy Show at Chicago in 1906. Since then a number of others have been planned and carried out in different parts of the country in cooperation with local authorities. These public exhibitions and the meetings held in connection therewith have proved to be of great educational value to the dairy interests of the country, and they have given a decided impetus to the movement for the improvement of the milk supply, especially in the large cities.

The present paper is intended to replace Circular 151, which was issued in 1909 and is now somewhat out of date.

Respectfully,

A. D. MELVIN,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

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MILK AND CREAM CONTESTS.

HISTORICAL.

Among those whose work deals with the sanitary production of milk, it is almost an axiom that "education accomplishes more than legislation." Laws can be applied up to a certain point; glaringly insanitary conditions can be dealt with severely, and willful wrongdoing should be promptly punished. After a certain degree of cleanliness has been attained, however, much of the further improvement must be based upon the incentive offered the producers to go to more trouble and expense to improve their product.

For the purpose of teaching producers the fundamentals of clean milk production, as well as offering them an incentive, the plan of holding milk and cream contests was devised. On February 14–24, 1906, during the National Dairy Show in Chicago, the first milk and cream contest was held. A tentative score card was devised by which the samples were rated; this score card has been modified from time to time as defects were demonstrated.

From the beginning rapid progress has been made, and in the six years from February, 1906, to February, 1912, forty such contests have been held under the direction of the Dairy Division, Bureau of Animal Industry, United States Department of Agriculture. At least 12 States have held contests either in connection with the State dairymen's associations or at the State fairs.

Believing that these contests would aid greatly in improving the milk supply of a city, in March, 1907, the first city milk contest was held in Cleveland, Ohio. The Dairy Division cooperated with the chamber of commerce by supplying judges and lecturers.

Since the Cleveland exhibition several other cities have seen the value of such contests and have conducted similar enterprises. Usually the chamber of commerce arranges for the exhibit by securing a meeting place, furnishing the prizes, and sending out advertising matter to the dairymen and the consumers. Among the cities that have held milk contests are Cleveland, Columbus, Toledo, Cincinnati, and Dayton, Ohio; Pittsburgh and Philadelphia, Pa.; and Detroit, Mich. The exhibits have not only increased in number but have grown greatly in size. The one held at Detroit in September, 1911, brought out 115 entries of milk and cream.

NATIONAL CONTESTS.

The contest for milk and cream producers annually held in connection with the National Dairy Show has grown remarkably since the first exhibition in 1906. Such a national contest brings together an unusually fine set of samples, which come from all parts of the country. From the data collected on the production of these samples, much useful and interesting information can be secured. The two most recent contests in connection with the National Dairy Show in the years 1910 and 1911 brought out 172 entries, which came from 22 States and Canada. The following States were represented in the order of samples submitted: Wisconsin, 22; Ohio, 21; Illinois, 19; Michigan, 18; Utah, 12; Pennsylvania and Massachusetts, 10 each; Canada, 8; New Hampshire, 7; Virginia and New York, 6 each; Colorado, Indiana, Missouri, Kentucky, and Washington, 4 each; Nebraska and Iowa, 3 each; New Jersey and California, 2 each; New Mexico, Kansas, and Louisiana, 1 each.

It will be seen from this list that the entries came from every part of this country and from Canada. Samples were sent from as far west as the Pacific States, from as far east as the New England States, from as far south as New Mexico and Louisiana, and from as far north as Canada.

The form of entry for the National Show is presented herewith:

[Front of entry blank.]

[National Dairy Show Association, Milk and Cream Show, Chicago, Ill. Under the direction of the Dairy Division, Bureau of Animal Industry, U. S. Department of Agriculture.]

OFFICIAL ENTRY BLANK—CLASS 6, MARKET MILK.

Date: ———, 191—.

GENTLEMEN: Please enter for me 4 quarts of market milk in competition for prizes offered by the National Dairy Show, in accordance with the conditions herein prescribed.

——— ———, *Proprietor.*
——— ———, *Manager.*

Post-office address, ———.

1. Competition in milk and cream department is open to all milk and cream producers in the United States and Canada.
2. Producers of market milk may compete in both market milk and market cream classes.
3. Producers of certified milk may compete in both certified milk and certified cream classes.
4. Producers of milk can make but one entry in any one class.
5. Producers of certified milk or certified cream are barred from competition in market milk and market cream classes. All samples of certified milk and cream must be accompanied by a certificate issued by a medical milk commission.
6. Entries in milk classes consist of 4 quarts of milk in quart bottles.
7. Entries in cream classes consist of 4 pints of cream in pint bottles.
8. All entries of milk and cream after scoring become the property of the United States Department of Agriculture.

9. No exhibitor will be entitled to a medal or diploma who does not make answer to each question, sign declaration, and forward this official entry blank to Ivan C. Weld, superintendent of milk and cream exhibits, National Dairy Show, 79 Dearborn Street, Chicago, Ill.

[Reverse side of entry blank.]

HOW TO COMPETE.

Milk entered to compete for prizes must be sent by express or otherwise from station nearest the producer direct to Ivan C. Weld, superintendent, milk and cream exhibit, care of Chicago Cold Storage Warehouse Co., 1532 Indiana Avenue, Chicago, Ill.

Express charges on exhibits must be prepaid to destination.

Bottles must be carefully packed, caps should be sealed, making bottle air tight, and both top of bottle and cap should be protected with paper, metal, or other material, and all covered with crushed ice sufficient to maintain a low temperature during transportation.

The package should be plainly addressed on outside. A card should also be tacked on box, on inside, giving plainly sender's name and address so as to avoid mistakes in identifying packages.

In order that all milk entered by exhibitors may be of the same age when scored, it is hereby specified that it shall be produced on Thursday, October 13, and shipped and delivered to express company at once. This is necessary for perfectly fair competition.

A representative of the Department of Agriculture will be in Chicago to take charge of the milk on its arrival and see that it is properly cared for.

QUESTIONS TO BE ANSWERED IN DETAIL BY EXHIBITORS OF MILK.

1. On what day and hour was the sample of milk, entered in this show, drawn?
2. How many cows contributed to the sample of milk entered?
3. How many cows in your herd are now giving milk?
4. How long since the cows contributing to the sample of milk freshened? (Average time.)
5. Are the cows supplying this sample grades or purebred? If purebred, give name of breed.
6. What kind and amount of feed was given cows daily during the week preceding the production of this sample of milk?
7. Were cows cleaned previous to milking? If so, describe method of cleaning.
8. Were cows in stable or out of doors when the sample of milk was drawn? If in stable, how was stable cared for?
9. What precautions were taken by the milkers as regards cleanliness of clothing and hands?
10. How many milkers were engaged in milking the sample entered?
11. What kind of milk pail was used; narrow or wide top?
12. How were pails cleaned previous to use?
13. Was milk drawn from the cow direct into the pail or through cloth cover or cotton filter?
14. What method of straining milk, if any, was followed?
15. How long after milk was drawn from cows before it was cooled?
16. Describe milk cooler, if any was used?
17. How was milk cooler prepared for use?
18. To what temperature was milk cooled?
19. How were bottles and caps prepared for use?

20. What bottling process, or what method of bottling, was followed?
21. How was milk cared for after bottling and previous to shipment?
22. Give date or hour when milk was (or will be) shipped.
23. Do you wish shipping case and bottles returned at your expense?
24. Have you previously exhibited milk or cream at any local, State, or national show?

Remarks: ———

I, ——— ———, do hereby declare each and every statement in answer to the above questions to be absolutely true. I do furthermore declare that the milk submitted by me in this contest is the pure natural product, free from preservatives, and that it has not been heated or changed in any way.

——— ———, *Proprietor.*
——— ———, *Manager.*

HOW CONTESTS ARE CONDUCTED.

In preparing for a milk and cream exhibit, the persons who have charge of the contest (in case of a city exhibit this is generally the chamber of commerce) usually send out preliminary notices to the dairymen, stating that a contest will be held at a certain time and urging them to prepare to enter samples. Later on, entry blanks such as the foregoing are sent out. The filling out and returning of these entry blanks is made a prerequisite to the entering of a sample of milk or cream in the contest. Usually there are four classes for which prizes are offered, namely, certified milk, certified cream, market milk, and market cream.

Certified milk and cream must be produced under the direction of a medical milk commission and bear the proper stamp of certification. Market milk and cream classes consist of those samples which are not eligible to compete as certified. All samples must be unheated and free from all preservatives. Producers of certified milk or cream are usually prohibited from entering any samples in the market classes.

MANAGEMENT OF THE SAMPLES.

There are no restrictions placed on the dairymen as to the production of the samples for the contest. The answers to questions on the entry blank show that many methods of milking are pursued. Sometimes the cows are milked in the barn. At other times they are milked in the pasture or feed lot. Various methods of cleaning the cows are resorted to, and the milk is handled in a varied number of ways after it is drawn from the cow.

All the samples of milk that are entered in a contest must be produced on the same day. This makes all the samples the same age when they are scored. After the milk is bottled, it is packed in a shipping case and surrounded with ice so that it will be in the best possible condition when it arrives at the place of exhibition.

The samples are consigned to some cold-storage warehouse in the city where the exhibit is to be held, and upon their arrival are put immediately in a cold room. In each entry are four bottles, one for chemical analysis, one for bacteriological examination, one for judging flavor, odor, sediment, and appearance, and one to be placed on exhibition. When all these samples have arrived, the four bottles in each entry are given a number, and a tag bearing that number is put around the neck of each bottle. The bottles, bearing simply the numbered tags, are submitted to the judges, and the scores are all made by numbers instead of by the names of the dairies.

It will be noticed on page 20 that in the tabulation of contests held with the new score card the one held in connection with the State Dairymen's Association at Baltimore, Md., in December, 1911, is omitted from the calculations in ascertaining the average scores. This contest was held under a different set of regulations from those that usually govern such exhibits. Instead of allowing the dairyman to submit a sample of milk produced in any way, the samples were taken at irregular intervals throughout one entire month from the farms of those entered in the contest. It was believed by those in charge of this contest that such a procedure would give a more definite idea of the average milk furnished by the dairymen and would also have the advantage of prolonging for 30 days a supply of high-grade milk from all the dairies entered.

Two objections, however, are readily seen to this method. First of all, the taking of samples at times unknown to the dairyman throughout an extended period is the legitimate duty of the health department of any city for the purpose of supervision, therefore a contest conducted along these lines is very liable to result in confusion in the minds of the dairymen as to the distinction between health department work and milk exhibits. The second objection is the most potent one. Under the usual procedure the dairyman knows just when and how the milk submitted to a contest is produced. At the time of milking he has to answer questions as to all the details of the process, so that he has a record of the condition of the cows, the cleanliness of his utensils, the feed, etc. Then, when he receives his score card and observes, for instance, that he has received a cut on flavor, he can go over the various details of the production of that milk and perhaps find the defective method, which caused the trouble. Where the samples are taken at times unknown to the dairyman the direct educational value is lost to a great extent. The dairymen do not know until some time afterwards when the samples were taken, and they have no means of knowing the conditions that prevailed at the time of milking the samples unless they have kept a complete diary of all methods and operations during the entire month.

On the other hand it has been argued by some that the score on a sample of milk submitted by a dairyman is not a correct indicator of the average product handled by that man. For instance, a man may ordinarily have a very mediocre supply of milk but by special efforts may produce a very high-scoring sample for competition. However, no claims should be made at the milk exhibits by those conducting such contests that a high-scoring sample will indicate that the exhibitor has an average supply of the same high quality. It is thought, moreover, that a man who learns the principles of clean milk production well enough to produce one sample of high-scoring milk will be much more likely to put those principles into general practice than will a man who has not mastered the principles at all.

SOME EXAMPLES OF PACKING.

Many ingenious packages for the shipping of milk have been sent to some of the shows. One firm in Canada had made a large box about 4 feet square, the sides, top, and bottom of which were made of thick cork. The whole was then covered with a preparation of tar to make it waterproof, and the bottles of milk were placed in a rack inside and the box filled with ice. The whole was then crated to prevent injury to the cork-board box. The cork was intended to serve as an insulation and to keep the ice from melting so rapidly.

One Colorado dairy sent milk to the National Dairy Show in 1911 which was shipped in a specially constructed crate made as follows: A galvanized cylinder was made for each bottle of milk and cream. These cylinders were fastened at the bottom in a galvanized-iron box. The bottles of milk and cream were set down in the cylinders and a tightly fitting cover placed over the top of each one. Then the space surrounding each cylinder inside the galvanized-iron box was filled with crushed ice.

So much interest in proper refrigeration of the samples has been manifested that exhibitors as far away as Seattle, Wash., have sent a man with the exhibit to re-ice it whenever necessary upon the journey.

METHOD OF SCORING THE EXHIBITS.

The samples are scored for bacteria, flavor and odor, visible dirt, fat, solids not fat, acidity, and the appearance of the bottle and cap. Cream is scored on the same basis as milk except that no score is given for solids not fat, the total of 20 points under chemical composition being given solely to fat.

The form of card at present in use for scoring the samples was devised in 1910 and follows.

[Front of milk score card.]

[United States Department of Agriculture, Bureau of Animal Industry, Dairy Division.]

SCORE CARD FOR MILK.

Place: ———. Class: ———. Exhibit No. ———.

Item.	Perfect score.	Score allowed.	Remarks.
Bacteria	35		Bacteria found per cubic centimeter
Flavor and odor	25		Flavor Odor
Visible dirt	10		
Fat	10		Per cent found
Solids not fat	10		Per cent found
Acidity	5		Per cent found
Bottle and cap	5		Cap Bottle
Total	100		

Exhibitor: ———. Address: ———.

(Signed) ——— ———, *Judge.*

Date, ———, 191—.

[Reverse side of milk score card.]

DIRECTIONS FOR SCORING.

BACTERIA PER CUBIC CENTIMETER—PERFECT SCORE, 35.

	Points.		Points.
400 and under	35	55,001 to 60,000	19
401 to 700	34. 5	60,001 to 65,000	18
701 to 1,000	34	65,001 to 70,000	17
1,001 to 2,000	33. 5	70,001 to 75,000	16
2,001 to 3,000	33	75,001 to 80,000	15
3,001 to 4,000	32. 5	80,001 to 85,000	14
4,001 to 5,000	32	85,001 to 90,000	13
5,001 to 6,000	31. 5	90,001 to 95,000	12
6,001 to 7,000	31	95,001 to 100,000	11
7,001 to 8,000	30. 5	100,001 to 110,000	10
8,001 to 9,000	30	110,001 to 120,000	9
9,001 to 10,000	29	120,001 to 130,000	8
10,001 to 15,000	28	130,001 to 140,000	7
15,001 to 20,000	27	140,001 to 150,000	6
20,001 to 25,000	26	150,001 to 160,000	5
25,001 to 30,000	25	160,001 to 170,000	4
30,001 to 35,000	24	170,001 to 180,000	3
35,001 to 40,000	23	180,001 to 190,000	2
40,001 to 45,000	22	190,001 to 200,000	1
45,001 to 50,000	21	Over 200,000	0
50,001 to 55,000	20		

NOTE.—When the number of bacteria per cubic centimeter exceeds the local legal limit the score shall be 0.

FLAVOR AND ODOR—PERFECT SCORE, 25.

Deductions for disagreeable or foreign odor or flavor should be made according to conditions found. When possible to recognize the cause of the difficulty it should be described under Remarks.

VISIBLE DIRT—PERFECT SCORE, 10.

Examination for visible dirt should be made only after the milk has stood for some time undisturbed in any way. Raise the bottle carefully in its natural, upright position, without tipping, until higher than the head. Observe the bottom of the milk with the naked eye or by the aid of a reading glass. The presence of the slightest movable speck makes a perfect score impossible. Further deductions should be made according to the amount of dirt found. When possible the nature of the dirt should be described under Remarks.

FAT IN MILK—PERFECT SCORE, 10.

	Points.		Points.
4.0 per cent and over	10	3.2 per cent	6
3.9 per cent	9.8	3.1 per cent	5
3.8 per cent	9.6	3.0 per cent	4
3.7 per cent	9.4	2.9 per cent	3
3.6 per cent	9.2	2.8 per cent	2
3.5 per cent	9	2.7 per cent	1
3.4 per cent	8	Less than 2.7 per cent	0
3.3 per cent	7		

NOTE.—When the per cent of fat is less than the local legal limit the score shall be 0.

SOLIDS NOT FAT—PERFECT SCORE, 10.

	Points.		Points.
8.7 per cent and over	10	8.1 per cent	4
8.6 per cent	9	8.0 per cent	3
8.5 per cent	8	7.9 per cent	2
8.4 per cent	7	7.8 per cent	1
8.3 per cent	6	Less than 7.8 per cent	0
8.2 per cent	5		

NOTE.—When the per cent of solids not fat is less than the local legal limit the score shall be 0.

ACIDITY—PERFECT SCORE, 5.

	Points.		Points.
0.2 per cent and less	5	0.23 per cent	2
0.21 per cent	4	0.24 per cent	1
0.22 per cent	3	Over 0.24 per cent	0

BOTTLE AND CAP—PERFECT SCORE, 5.

Bottles should be made of clear glass and free from attached metal parts. Caps should be sealed in their place with hot paraffin, or both cap and top of bottle covered with parchment paper or other protection against water and dirt. Deduct for tinted glass, attached metal parts, unprotected or leaky caps, partially filled bottles, or other conditions permitting contamination of milk or detracting from the appearance of the package.

BACTERIA.

The samples are all plated for bacteriological examination on the same day. Standard methods of plating on agar are used, and the samples are incubated for 48 hours. In milk-contest work the dilutions used are 1 to 100 and 1 to 1,000, as these will give results close enough for such work. Any sample having less than 400 bacteria per cubic centimeter receives a perfect score, while any sample having over 200,000 bacteria per centimeter receives a zero. No attempt is made to differentiate between the kinds of bacteria present, a quantitative analysis only being made. It is a well-established principle that in the production of market milk all kinds of bacteria are to be avoided, so the awards are made on the basis of freedom from bacteria of any kind.

As bacteria in milk are extremely undesirable, both from a health as well as from an economic standpoint, the greatest weight on the score card is given to freedom from bacterial contamination, 35 out of 100 points being allowed for this item.

FLAVOR AND ODOR.

While not so important as bacteria in their relation to public health, the flavor and the odor of dairy products influence considerably their commercial value. If consumers are served with an unpleasantly flavored milk, they will either use less of the product or will seek some other dealer whose products are more acceptable. The most common "off flavors" found in contest milk and cream are those produced by certain feeds, such as garlic, turnips, etc., and by the absorption of foul odors from the stable air. These defects will be considered more fully later on.

In scoring it is best to allow the samples to stand for a short while in a warm room, as undesirable flavors and odors are more easily detected if the milk is slightly warm. The room where the scoring is done should be as free as possible from any odors. The bottle cap is removed and the milk is quickly poured back and forth between the bottle and a clean receptacle until a thorough mixture results. About half of the milk is poured back into the bottle, the cap replaced, and the whole well shaken. Then, if the cap is removed and the nose quickly applied to the mouth of the bottle odors can be quickly detected if present.

Flavors are, of course, scored by tasting the sample; if the flavor is very bad it can usually be definitely classified, but often the flavor is so slight or indistinct that it can not be traced with certainty. Even though this be the case, an experienced judge of milk is able to score the flavor of the product very accurately. Flavor and odor are allowed 25 points out of 100.

VISIBLE DIRT.

Sediment in the bottom of a bottle of milk is a mute indication of gross carelessness somewhere between the cow and the consumer. Freedom from visible dirt does not mean that the milk is necessarily clean, but the presence of sediment does mean that not only was dirt allowed to fall into the milk, but that not even enough care was taken to strain it out.

To score absolutely perfect on this point, the judge must be unable to find so much as a single movable speck at the bottom of the bottle. Very few samples have been scored perfect on this point, while some have been marked as low as zero on account of an extremely heavy precipitate of manure, dust, sand, cow hairs, or chaff.

Before scoring, the bottles should be allowed to stand quietly for some time to allow any sediment present to settle. Then the bottle should be carefully raised until the bottom can be examined. An electric bulb on a long cord is a great aid in this work, as the light can be held close to the bottle. A maximum of 10 points out of 100 are allowed for absolute freedom from visible dirt.

FAT AND SOLIDS NOT FAT.

The solids in milk are apportioned 20 points out of 100. In cream the entire 20 points is given to the fat content, but in milk the credits are divided into two items, 10 points each being allowed for the fat and the solids not fat. In considering cream, 20 per cent or more of fat is allowed a perfect score; with milk 4 per cent of fat and 8.7 per cent of solids not fat is considered the minimum for which a perfect score can be given. If the sample of milk or cream contains less than the local legal standard, a zero is given on the score card.

The fat is determined by the Babcock method, while the solids not fat are calculated by the formula $\frac{L+F}{4}$. In this formula L stands for the corrected Quevenne lactometer reading and F represents the fat. As an illustration of this formula, let us suppose that the fat test is 4 per cent and the corrected lactometer reading is 32. Then, $\frac{32+4}{4}=\frac{36}{4}=9$. Hence, the solids not fat equal 9 per cent.

ACIDITY.

The acidity is allowed 5 points out of 100. Phenolphthalein is used as an indicator, and the milk is titrated with tenth-normal sodium hydroxid. The results are reduced to percentages and the scores allowed according to the scale on the score card. As 0.2 per cent is considered the danger line in commercial milk and cream, no sample containing more than that amount of acidity is given a

perfect score. While such milk may taste perfectly sweet, it has been found that it is usually unsafe to use it on account of the fact that it is apt to turn sour very quickly.

BOTTLE AND CAP.

The general appearance of the sample is considered of enough importance to demand an allowance of the remaining 5 points out of the 100. Samples should all be submitted in regulation milk bottles, and the mouth of the bottle should be thoroughly protected from the entrance of dust, dirty water, etc. Deductions should be made for chipped or dirty bottles, flaws in the glass, or other imperfections. Metal parts, especially such as come in direct contact with the milk, should be scored against. It very often happens that the caps used are hastily placed in the bottles or are not of the proper size. This should be penalized, as it results in leakage from the bottle as well as allowing dirty ice water, etc., to seep into it.

Bottles should be entirely filled so that there will be no room for churning during transit. Deductions should be made for violations of this rule.

EDUCATIONAL FEATURES.

Whenever milk and cream contests are held, it is desirable to have in connection therewith a meeting or a series of meetings at which the subject of clean milk production is thoroughly discussed. Usually at least two meetings are held, one for the producers and the other for consumers. At the producers' meeting the technical side of clean milk production is taken up and the dairymen are shown how they can improve the quality of their product. Comments are made on the samples entered in the competition, and remedies for the defects are suggested. At the consumers' meeting great stress is laid on the fact that clean milk is more difficult and expensive to produce than dirty milk, and an effort is made to educate the consumer to the point where he will be willing to pay an increased price for a safer and more wholesome article of food. Instruction is given to city milk consumers as to the proper care of milk in the home after it is delivered to them by the producer. These lectures are very often illustrated with stereopticon slides, and in one or two cases moving pictures illustrative of good and bad methods on the dairy farms have been secured.

LIST OF EXHIBITIONS.

The statements following show the most important facts relating to all the competitive exhibitions so far held in cooperation with the Dairy Division.

List of milk and cream contests held in cooperation with the Dairy Division prior to adoption of new score card.

Name and place.	Date.	Product.	Number of entries.	Average score.
National Dairy Show, Chicago, Ill	Feb. 15, 1906.	Market milk	23	89.70
		Market cream	14	93.60
		Certified milk	8	94.80
Granite State Dairymen's Association, Peterboro, N. H.	Dec. 6–7, 1906.	Market milk	11	90.80
		Market cream	9	91.40
City milk contest, Cleveland, Ohio	Mar. 16, 1907.	Market milk	53	90.30
		Market cream	6	88.50
Granite State Dairymen's Association, Whitefield, N. H.	Dec. 5–6, 1907.	Market milk	4	83.20
		Market cream	6	89.40
State Dairymen's Association, Marengo, Ill	Jan. 13–15, 1908.	Market milk	6	93.20
		Market cream	2	93.50
Pennsylvania State Dairy Union, Wilkes-Barre, Pa.	Jan. 14–16, 1908.	Market milk	10	91.90
		Certified milk	4	95.80
State Dairymen's Association, Columbus, Ohio	Feb. 12–14, 1908.	Market milk	10	89.90
		Market cream	12	90.00
State Dairymen's Association, Battle Creek, Mich.	Feb. 19–21, 1908.	Market milk	5	95.50
		Market cream	4	94.40
City milk contest, Cleveland, Ohio	Mar. 7, 1908.	Market milk	38	88.50
		Market cream	6	90.50
State Dairymen's Association, Traverse City, Mich.	Mar. 11, 1908.	Market milk	10	91.10
City milk contest, Pittsburgh, Pa	Oct. 22, 1908.	Market milk	50	85.20
		Market cream	8	77.70
National Dairy Show, Chicago, Ill	Dec. 2–10, 1908.	Market milk	30	85.70
		Market cream	20	83.80
		Certified milk	14	90.20
		Certified cream	6	85.90
State Dairymen's Association, Dexter, Me	Dec. 8–10, 1908.	Market milk	39	91.60
		Market cream	31	88.60
State Dairymen's Association, Burlington, Vt	Jan. 6, 1909.	Market milk	29	90.60
		Market cream	16	81.30
Granite State Dairymen's Association, Contoocook, N. H.	Jan. 13–14, 1909.	Market milk	5	92.50
		Market cream	7	90.40
City milk contest, Columbus, Ohio	Feb. 5, 1909.	Market milk	15	91.80
		Market cream	7	92.30
State Dairymen's Association, Grand Rapids, Mich.	Feb. 17–19, 1909.	Market milk	6	81.10
		Market cream	4	95.20
City milk contest, Toledo, Ohio	Feb. 27, 1909.	Market milk	7	90.80
		Market cream	5	86.00
Kentucky Dairy Cattle Club, Lexington, Ky	Mar. 13, 1909.	Market milk	4	94.20
Michigan Dairymen's and Grand Traverse Dairymen's Associations, Traverse City, Mich.	Mar. 25, 1909.	Market milk	6	93.50
City milk show, Cincinnati, Ohio	May 7, 1909.	Market milk	47	83.80
		Certified milk	25	87.71
City milk show, Grand Rapids, Mich	May 14, 1909.	Market milk	39	90.63
		Market cream	14	89.59
City milk show, Dayton, Ohio	Sept., 1909.	Market milk	11	90.71
		Market cream	1	91.00
Illinois State Fair, Springfield, Ill	Oct. 1–9, 1909.	Market milk	7	74.70
		Market cream	7	78.80
		Certified milk	2	72.00
National Dairy Show, Milwaukee, Wis	do	Market milk	21	85.05
		Market cream	13	85.12
		Certified milk	12	79.10
		Certified cream	6	81.75
City Milk Show, Pittsburgh, Pa	Nov. 4, 1909.	Market milk	44	89.24
		Market cream	4	92.10
Maine Dairymen's Association, Skowhegan, Me	Dec. 1, 1909.	Market milk	51	89.70
		Market cream	31	86.00
Michigan Dairymen's Association, Detroit, Mich.	Feb. 4, 1910.	Market milk	8	95.81

Summary to February 4, 1910.

Number of contests			28
Samples entered	893		
	Milk	654	
		Certified	65
		Market	589
	Cream	239	
		Certified	12
		Market	227
Average scores			
	Certified milk		87.54
	Certified cream		83.83
	Market milk		88.77
	Market cream		87.47

It should be stated that up to this date certified milk and market milk were judged by different standards, hence it is owing to this fact and not to inferiority that the former has a lower average score than the market milk. During 1910 new score cards for milk and cream were devised, which gave greater weight to the bacterial count and less to flavor and chemical composition. A copy of the new milk score card is shown on pages 13 and 14. The results of the competitions since the introduction of the new cards are as follows:

List of milk and cream contests held in cooperation with the Dairy Division since adoption of new score card.

Name and place.	Date.	Product.	Number of entries.	Average score.
Illinois State Fair, Springfield, Ill.	Oct. 4, 1910.	Certified milk	1	90.30
		Certified cream	1	95.00
		Market milk	13	68.77
		Market cream	6	67.22
National Dairy Show, Chicago, Ill.	Oct. 19–29, 1910.	Certified milk	30	86.75
		Certified cream	8	85.45
		Market milk	51	85.13
		Market cream	16	79.11
State Dairymen's Association, Baltimore, Md.	Nov., 1910.	Market milk	37	75.91
Kentucky Dairy Cattle Club, Lexington, Ky.	Jan. 3–5, 1911.	Certified milk	3	91.50
		Certified cream	3	87.33
		Market milk	7	75.93
		Market cream	3	69.33
State Dairymen's Association, Roanoke, Va.	Jan. 11, 1911.	Market milk	13	89.98
		Market cream	3	83.66
State Dairy Union, Harrisburg, Pa.	Jan. 23–27, 1911.	Certified milk	1	86.75
		Market milk	8	87.55
		Market cream	2	75.13
Philadelphia Milk Show, Philadelphia, Pa.	May 20–27, 1911.	Certified milk	16	86.18
		Certified cream	2	89.25
		Market milk	16	85.13
		Market cream	4	74.56
City milk show, Detroit, Mich.	Sept. 25–26, 1911.	Market milk	111	75.40
		Market cream	4	79.56
State fair, Springfield, Ill.	Sept. 29–Oct. 7, 1911.	Certified milk	1	83.90
		Certified cream	1	86.25
		Market milk	16	77.46
		Market cream	14	80.26
National Dairy Show, Chicago, Ill.	Oct. 26–Nov. 4, 1911.	Certified milk	17	88.46
		Certified cream	4	91.28
		Market milk	28	84.68
		Market cream	18	80.09
State Dairymen's Association, Baltimore, Md.	Dec. 7–8, 1911.	Market milk	33	[1] 67.07
State dairy union, Pittsburgh, Pa.	Jan. 15–20, 1912.	Certified milk	1	93.25
		Market milk	42	85.33
		Market cream	3	88.75

[1] The low average score at Baltimore is due to the method (used in this case only) of selecting the samples at random during a period of one month, while in all other cases the samples were submitted on a given date by the exhibitors.

Summary of scores made with new cards.

Number of contests					12
Number of samples	537	Milk	445	Certified	70
				Market	375
		Cream	92	Certified	19
				Market	73

AVERAGE SCORES OF RECENT CONTESTS.

The average scores of the above-mentioned contests in which the new score cards were used (excluding the Baltimore contest, which is not comparable with the others because of the different method of selecting the samples for competition as already explained) are as follows:

Average scores, in detail, of contests where the new cards were used (excluding Baltimore)

Item.	Perfect score.	Milk.		Perfect score.	Cream.	
		Certified.	Market.		Certified.	Market.
Bacteria	35	30.45	23.87	35	29.37	21.32
Flavor and odor	25	19.50	20.05	25	20.11	19.26
Visible dirt	10	8.85	8.36	10	9.27	8.77
Fat	10	9.64	9.13	20	19.53	19.75
Solids not fat	10	9.84	9.47			
Acidity	5	4.73	4.62	5	4.74	4.70
Bottle and cap	5	4.95	4.53	5	4.80	4.62
Total	100	87.96	80.03	100	87.82	78.42

To demonstrate further the weakest points in the samples entered in these contests, a table is given below which shows the scores on each class of milk and cream in terms which indicate the percentage of the average score to the perfect score.

Percentage of perfection attained by samples in preceding table.

Item.	Milk.		Cream.	
	Certified.	Market.	Certified.	Market.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Bacteria	87.00	68.20	83.91	60.91
Flavor and odor	78.00	80.20	80.44	77.04
Sediment	88.50	83.60	92.70	87.70
Fat	96.40	91.30	97.60	98.75
Solids not fat	98.40	94.70		
Acidity	94.60	92.40	94.80	94.00
Bottle and cap	99.00	90.60	96.00	92.40

These two tables bring out some very interesting data concerning the samples of milk and cream entered. In the first place, it will be noticed that certified milk had an average score of almost 8 points more than the market milk, and the certified cream had a score of over 9 points better than the market cream.

It is believed that the new form of the milk and cream score card which is now in use gives a great deal better analysis of the quality of the milk than the old one. In the old card too much stress was laid on flavor and not enough on the bacterial count. Furthermore, the old milk and cream score cards put certified milk and cream at a disadvantage, as different cards were used for the certified and market classes, the standards for certified milk being much higher

than those for market milk. For example, market milk having a bacterial count of under 10,000 per cubic centimeter was considered perfect, while certified milk had to have a bacterial count of less than 1,000 to be considered perfect. Therefore, if samples of market milk and certified milk each containing 10,000 bacteria per cubic centimeter had been entered, the market milk would have received a score of 20, while the certified milk would have been given 10. It will be seen from this that the certified milk was at a disadvantage of about 10 points as regards bacterial count. This must be remembered in looking over the average scores made in the contests held while the old score cards were in use. Also a higher standard was made for acidity in certified milk than in market milk.

It was decided after much deliberation that only one score card should be used for milk, whether it be certified or market. The great point to be made in the consideration of milk is its value as a food for infants, so in the final analysis all milk must be considered from the same standpoint when held up to the standard of perfection. In subsequent contests, as tabulated, the single score card was used, and it will be seen that since the inauguration of this card certified milk has shown a marked superiority to market milk.

The new card balances up the desirable characteristics in a much better way than the old, and the results seem to justify the change. Certified milk averaged better than market milk on every point except on flavor and odor, where it fell half a point behind market milk. Certified cream averaged better than market cream on every point except on fat. This may perhaps be accounted for by the fact that some milk commissions require a fat content of only 18 per cent, while no cream is scored perfect on the score card unless it has 20 per cent of fat or more. Undoubtedly some of the certified samples were submitted under the misapprehension that if the fat complied with the milk commission's requirements it would be scored perfect on the score card. Both certified and market milk had a lower bacterial count and consequently a higher score on bacteria than the cream in the respective classes. On the other hand, the acidity ran higher in the milk of both classes than it did in the corresponding cream. The cream in both classes was noticeably freer from sediment or visible dirt than was the milk.

The average score of the certified milk for bacteria, 30.45 per cent, indicates that the average sample submitted contained from 7,000 to 8,000 bacteria per cubic centimeter. The average fat content was between 3.8 and 3.9 per cent. The average solids not fat were almost 8.7 per cent, while the average acidity ran between 0.2 and 0.21 per cent. In the market milk the average score indicates a bacterial count of between 30,000 and 40,000; the fats average between 3.5 and 3.6 per cent; the solids not fat between 8.6 and 8.7 per cent; while the acidity was between 0.2 and 0.21 per cent.

The certified cream shows an average score which indicates a bacterial count of between 8,000 and 10,000 per cubic centimeter, while the market cream ran between 45,000 and 50,000 bacteria per cubic centimeter. The chemical composition on both kinds of cream was very nearly perfect.

Considering that the above samples were some of them shipped 2,000 miles or more, were several days in transit, and after their arrival at the point of exhibit were held in storage for several days, making them over a week old when scored, the showing is remarkable and points out very strongly the fact that milk properly produced and handled and thoroughly refrigerated in transit and storage can be kept sweet for a considerable length of time.

BENEFITS OF MILK CONTESTS TO DAIRYMEN.

As milk and cream contests are intended primarily for the education of the dairymen, it is interesting to go over the scores made in some of these contests to see whether they accomplish the purpose. Two things are very noticeable in going over the scores of contests which have been held in the same place two years in succession. The first is that dairymen who compete for two successive years almost always do better in a second contest than they did in their first attempt, showing very plainly that they have received valuable suggestions as to the production of sanitary milk. The second is that dairymen who have had previous experience in these competitions nearly always do better than those who are competing for the first time. The following results which have been tabulated from three contests show conclusive figures along these lines:

MARYLAND STATE DAIRYMEN'S ASSOCIATION, 1911 CONTEST.

	Average score.
10 men who competed the year previous	73.83
23 men competing for the first time	64.15

ILLINOIS STATE FAIR.

	Average score 1910.	Average score 1911.
7 dairies which competed both years	74.64	79.68
7 dairies which did not compete in 1910		64.39

NATIONAL DAIRY SHOW.

Market milk.

	Average score 1910.	Average score 1911.
5 dairies which competed both years	89.50	89.53
23 dairies which did not compete in 1910		83.62

Certified milk.

14 dairies which competed both years	83.10	91.05
3 dairies which did not compete in 1910		75.72

Looking at the Maryland State Dairymen's Association's 1911 contest, it is seen that the 10 men who had had previous experience in preparing milk for contests averaged over 9 points better on the score card than those men who were competing for the first time.

At the Illinois State Fair in 1911 those who had competed the year previous bettered their former scores by over 5 points and averaged over 15 points more than the dairymen who were competing for the first time.

The scores made by both market and certified milk samples at the National Dairy Shows in 1910 and 1911 have been compiled, and they show similar results for the two years, though in the case of market milk the improvement from 1910 to 1911 is very small; but the fact that the dairies which had had the advantage of a previous competition averaged 6 points better than the new competitors bears out the truth of the statements made in this connection. With the certified milk the improvement was very remarkable, since 14 dairies increased their scores in 1911 over the marks made in 1910 by nearly 8 points and exceeded the 3 certified dairies which were competing for the first time by over 15 points.

These figures, which are the result of the compilation of a large number of samples, show remarkably well how the dairyman is taught by these contests to improve the quality of his product. The score cards made on each exhibit of milk and cream are always sent to the competitors with comments on the defects of the product, and they usually contain suggestions for remedying the same. Progressive dairymen everywhere are availing themselves of the benefits derived from these contests and are finding that the competition aids them in many ways.

EXTRACTS FROM LETTERS.

The following are quotations from letters that have been received from dairymen subsequent to milk contests:

I was so much surprised on the following morning after the announcement, when I arrived in town the people came in every direction to congratulate me on my succcess, I could not believe it. From the fact that there are so many older and more experienced dairymen than myself I was not expecting anything of the kind.

I have this much confidence in myself that if I won this time I will try again. I have discovered where I can make much improvement next time in flavor.

I expect to use narrow-top pails hereafter. I use straw for bedding; I dampen my bedding with a sprinkler just before the cows go in. I washed my cow 12 hours before milking; later, I rubbed her down; one hour before milking I rubbed her down again with a damp cloth.

* * * * * * *

We are very glad that we had our goods entered. The winning of cup and honorable mention are a source of satisfaction, not from their value, but to know our standing.

We have been trying to produce good, clean, wholesome products, but did not know where we stood as compared with others, as this was our first entry.

It has certainly been a good advertisement for us, as we have not been able to fill our orders since.

* * * * * * *

Although my milk was not good enough to receive a diploma, I learned more than if it had scored better. The appearance of the samples on Friday made me think I was free of many undesirable kinds of bacteria, and I believe that if my methods are improved I can produce as good milk as is produced in the much more expensive plants.

SUGGESTIONS FOR THE PRODUCTION OF CONTEST MILK.

It has been found in looking over the answers to the questions concerning the production and handling of the best samples of milk and cream entered in contests that the producers have in every case exercised great care and that the results obtained bear out the principles which have been laid down from time to time as necessary for the production of pure milk. It is not the purpose here to go into great detail regarding all methods which might be used, but a short résumé will be made of the more important things to be considered in preparing a sample of milk or cream to enter in one of these contests.

BACTERIA.

As the bacterial count has so much weight on the score card, it will very naturally be the source of much consideration on the part of the producer. The bacterial count in samples entered in past contests has varied from less than 100 to several millions per cubic centimeter. As it can be assumed that anyone preparing samples for contests will exercise all the care and intelligence which he possesses, it must be concluded that at the present time many of our producers do not understand just where the bacteria come from and how their entrance into the milk can be prevented.

First of all, it is necessary in the production of milk which will have a low bacterial count to have absolute cleanliness in every branch of the work. The barn itself and the barn air must be free from dust at the time of milking. This can be accomplished by keeping the walls, ceiling, and floors scrupulously clean, and some producers have even gone so far as to sprinkle the air in the barn, and also the bedding with a fine spray of water to lay the dust just before milking time. The cow herself is a very dangerous source of bacterial contamination. She very often carries on her hide dust, dried manure, loose hair, and other impurities, and these fall into the milk pail during the process of milking. To produce milk of the highest grade it is necessary to have the cows thoroughly groomed with the currycomb and brush, so that there will be no accumulation of manure or other filth upon the cow's body. Just before milking is commenced the cow's udder and flanks should either be wiped with a damp rag or the parts thoroughly washed and then dried with a clean towel so

that no water can drip from the body into the milk pail. Better results are secured if the cow's hair is slightly moist, however, and not entirely dry during milking. This method will wash out of the cow's hide much dust and dirt which would not be removed by currying. The hands of the milker should be thoroughly cleaned and he should milk dry-handed to secure the best results.

It has been demonstrated that a large number of the bacteria which find their way into milk can be kept out provided a small-top milk pail be used. Such a pail protects the surface of the milk from dust and germs which may drop from the cow's body during milking. All utensils which come in contact with the milk, such as pails, strainers, bottles, dippers, etc., should be sterilized with either live steam or boiling water. Many dairymen make the mistake of thoroughly washing the bottles and then rinsing them with water which is only warm. This does not kill the bacteria which may be on the surface of the utensils, and considerable contamination ensues. Many successful competitors in the past have been in the habit of discarding the first few streams of milk from each teat, because they are known to contain much larger numbers of bacteria than the milk which follows. Milking should be done as quickly as possible and with as little agitation of the cow's udder as is possible, as such a disturbance is very apt to shake bacteria from the cow's hide into the milk pail.

As milk is so easily contaminated, it is necessary to take it as soon as drawn to a clean, convenient milk house, where it can be cooled immediately. The milk house should be well protected against flies and should be scrupulously clean. As bacteria grow in warm milk very fast, prompt cooling is an absolute necessity. Fresh milk containing 100 bacteria per cubic centimeter if not cooled down will in the course of time contain the offspring of the original bacteria, which may amount to millions. In the scoring of cream it has been noticed that the bacterial count has averaged higher than that of the milk samples submitted. This may be due to the fact that clumps of bacteria are broken up by the force of the separator, and hence an apparently larger count is the result, or it may be due to the fact that the milk passes through one more piece of apparatus, namely, the separator, which is not always thoroughly cleaned and sterilized.

The bottles into which the product is put and the caps with which they are sealed should both be sterilized so that no contamination can ensue. In cooling the milk it is not necessary that any special form of cooler be used. In fact, many of the successful competitors in the past who have obtained very low bacterial counts have believed that the exposure of the milk to the air in passing over a cooler was not a desirable feature, and have bottled the milk warm and cooled it by placing the bottles in ice water. While this method does not

cool the milk quite as quickly, it saves it from any possible contamination due to exposing it in a thin sheet to the air. Bottles should be kept in ice or ice water until ready for shipment; then they should be packed in a durable shipping case surrounded with ice and forwarded without delay.

FLAVOR AND ODOR.

Several causes contribute to undesirable flavors and odors in milk and cream. There is the flavor which is the result of bacterial action. This flavor may be due to the lactic-acid bacteria which sours milk. Samples have been submitted in contests which were actually curdled, and of course they could not receive any credit for flavor and odor, as they were commercially of no value as market milk. Then certain forms of bacteria cause fermentation or decomposition in milk, and when they have worked for any length of time they cause a very undesirable flavor.

Certain feeds also contribute to the flavor and odor. In several competitions milk has been cut heavily because of a pronounced garlic flavor. Silage flavor is very often in evidence, especially during cold spells in the winter when the barns are kept tightly closed. If the silage is fed directly after milking instead of either before or during milking there should be no trouble with silage flavor in milk. There is one thing, however, that must be remembered: If the cows leave any silage in the mangers it must be cleaned out and taken from the barn when they are through, as the warm milk very readily absorbs the odor of the silage if it is in the air. The stable air, if close or "cowy," is another source of bad odors which are absorbed by the milk. Sometimes flavors are detected in milk which are due to foreign substances. Bottles have been submitted which had rubber parts in contact with the milk, and the milk had absorbed the flavor of the rubber. The use of improperly paraffined caps is very apt to give rise to a "brown paper" flavor in the milk.

It would seem that the best results, so far as flavor and odor go, can be secured by taking the milk of three or more cows and mixing it. Sometimes the physical condition of the cow or the period of her lactation will influence the flavor of the milk considerably, so if the milk from only one cow is submitted there is a risk of the individuality of the cow playing some part in the flavor. It is also best to avoid "stripper" milk on account of a strong flavor which very often develops in this product.

VISIBLE DIRT.

With proper care in milking, or even with proper care in straining, there is no excuse for large amounts of sediment in milk. As a matter of fact, however, very few samples even in the certified milk class have been scored perfect on this point, and some samples have

been so extremely dirty as to have been given a zero on the score card. The sediment usually found is a fine dark-brown or black precipitate, which is the result of dust and dried manure finding its way from the cow's hide into the milk. Some of this fine sediment in a state of temporary suspension in the milk may pass through coarse strainer cloths, if such are used, and settle to the bottom of the bottle after the milk is allowed to stand for any length of time. Very often large pieces of foreign matter have found their way into the milk. In some cases it is almost unbelievable that such matter could get into contest milk and escape the observation of the producer. Bits of straw and hay sometimes an inch or an inch and a half long have been found in the bottom of the bottle. Cow hairs and bristles from bottle brushes have very often been found in the sediment.

To avoid visible dirt in the milk and thus receive a high score on this point, it is necessary to follow the rules for cleanliness laid down under the heading "Bacteria." Sometimes the sediment is due to the fact that pails or bottles after being sterilized are allowed to stand uncovered. If there is any wind stirring, chaff, dust, etc., are almost sure to be blown into the pails or bottles and will thus appear as sediment in the milk. Coarse strainers should be avoided if the producer wishes to get all of the fine dirt out of the milk. The best results in the past have probably been secured with the use of cotton as a straining medium. Various forms of cotton are on the market, some in bulk and some prepared in thin sheets especially for straining. In the answers to questions on the production of milk for contests there does not seem to be any special advantage in milking onto a strainer over the milk pail. Unless the strainer cloths are changed with every cow, such a practice is liable to result in worse contamination than if the milk were simply milked into an open pail and then strained into the can.

FAT AND SOLIDS NOT FAT.

Except in occasional cases, a normal milk having a fat content of 4 per cent will contain over 8.7 per cent of solids not fat. In the past several samples have been entered at contests which have very apparently been modified by the producer in the attempt to obtain a higher score on chemical composition. Milks testing 8 per cent of fat and over have been submitted. Fortunately, such an adulteration is very easily seen by the judges when the fat is compared with the solids not fat. The unfortunate contestant who tries to improve upon nature in this manner injures more than helps himself. Any milk containing as much as 4 per cent of fat receives a perfect score, so that an 8 per cent milk gets no higher score on fat than a 4 per cent milk. The result of adding cream to milk to bring it from a 4 per cent to an 8 per cent fat is to lower the proportion of solids not fat

in the milk, so that the score on that item is cut sometimes considerably. In normal milk the solids not fat increase (but not in the same ratio) as the fat increases. In milk to which cream has been added, however, the fat increases and the solids not fat are decreased.

Another very common mistake in the past has arisen from the desire of contestants to lower the bacterial count as much as possible. To eliminate contact with all unnecessary utensils, some contestants have milked directly into the milk bottle. Such a practice is almost sure to upset the chemical composition and thus be severely marked down on the score card. The first part of the milk drawn from the cow is quite deficient in fat, while the very last of the milk runs high in fat. It is necessary in order to have a normal chemical composition in milk to take all of the milk from one or more cows and mix it thoroughly together.

ACIDITY.

The presence of acid-forming bacteria in milk in large numbers is usually responsible for a high acidity. It may be that there are other factors which play an important part in the acidity of milk, but at the present time they are not well defined. To keep down the acidity of milk due to acid-forming bacteria, it is necessary to keep the bacterial count down as low as possible through the precautionary measures previously mentioned. To prevent the growth of bacteria the milk must be thoroughly iced from the time of milking until it is scored.

BOTTLE AND CAP.

It is best to select bottles which are made of clear glass and which are free from flaws and other imperfections. The bottles should be filled up to the cap seat with the milk and cream to be shipped. The cap should fit the mouth of the bottle tight enough to prevent leakage but not so tight that it will have to be jammed in order to force it into place. Melted paraffin may be poured on top of the cap after it is in place, and should be sufficient in amount to fill up flush to the mouth of the bottle the depression where the cap rests. The whole may be protected by some waterproof material such as oiled or paraffined paper, tin or tin-foil caps, etc. The heaviest cuts against the appearance of the bottle and cap in the past have been made because either the bottles have not been filled sufficiently or because the cap and the mouth of the bottle have not been properly protected. The protection of the mouth of the bottle is important not only from the standpoint of appearance, but because of the fact that iced cases of bottles are piled one above the other in the summer time and there is quite often a large amount of dirty water, resulting from the mixture of dust and melted ice, which trickles down upon the bottles below.

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